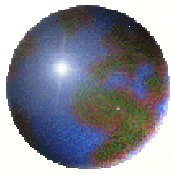


Primenergy, L.L.C. Biomass Energy Conversion

Poultry Litter to Energy

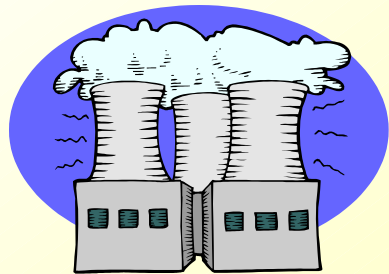
A Solution for the Watershed



Poultry Litter as an Alternate Energy Source

- *Poultry Bedding is Biomass Fuel, i.e. Wood Chips, Sawdust, Rice Hulls*

- *Power Generation from Biomass is Alternative, Renewable “Green” Energy*



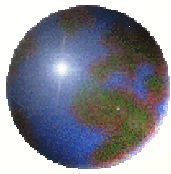
- *Conversion of Litter into Energy is Carbon Dioxide Neutral*

- *Use as Fuel Creates a New, Continuous Outlet for Litter, Improving Poultry House Utilization*

- *Phosphorus and Other Soil Nutrients are Captured as Benign, Odor-free Ash*

- *The Discharged Ash has Value as an Exportable Fertilizer*



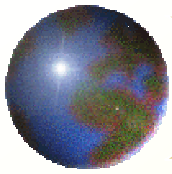


Advantages of Gasification



- *Controlled Air Gasification Eliminates*
 - *Fuel Slagging*
 - *Heavy Particulate Loading in the Synthesis Gas*
 - *Lower Temperature Operation Vaporizes Less Pollutants*
- *Gasification Produces a Synthesis Gas*
 - *Gases Can Be Intermediately Cleaned*
 - *Gases Can Be Burned in Stages for Proactive Pollution Control*
- *Recognized by the US Department of Energy and Environmental Organizations as Superior Combustion Technology*
- *Gasification is **not** Incineration*

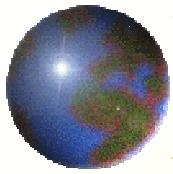




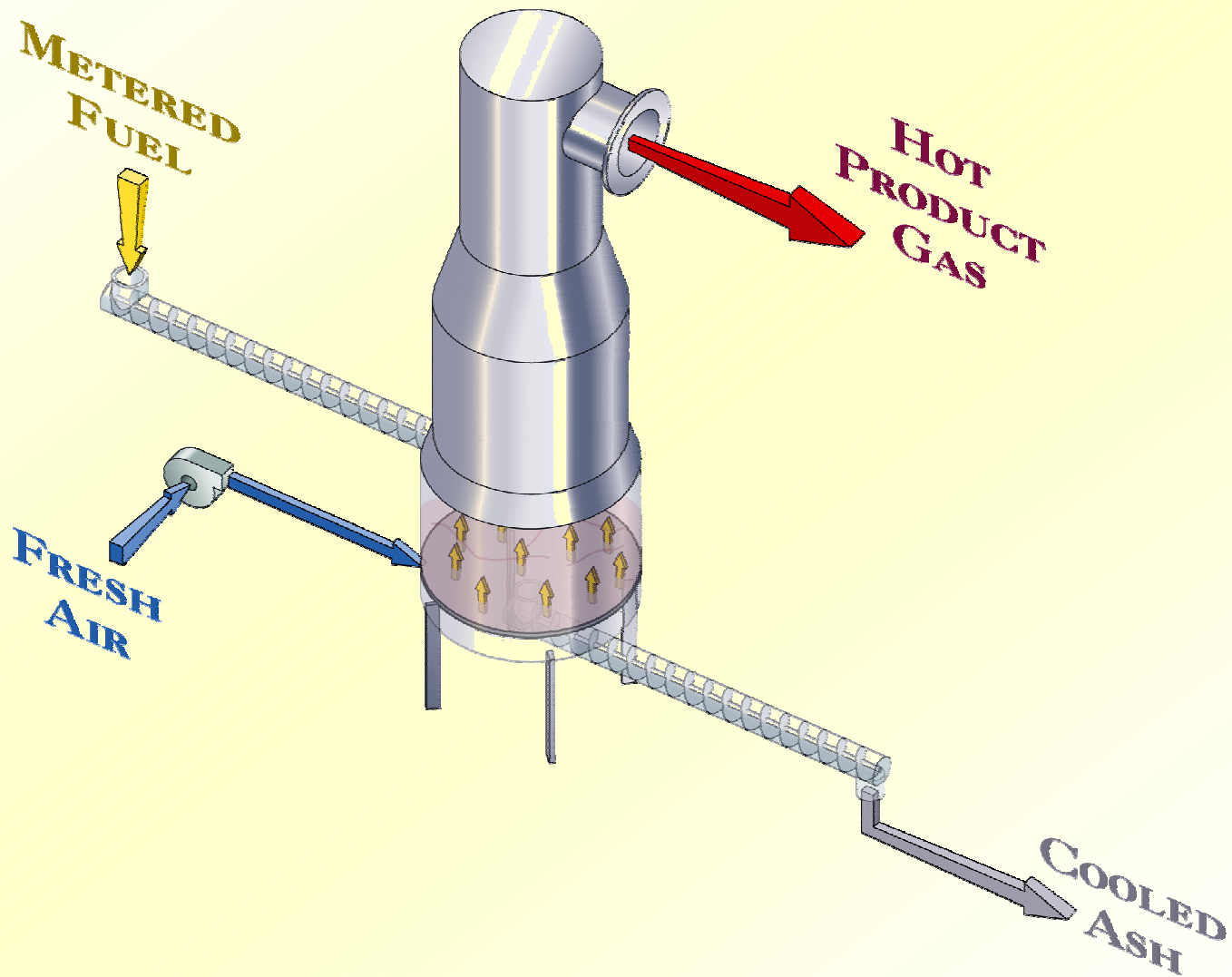
Biomass Gasification Technology

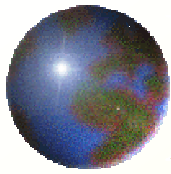
- ***More Commercial Biomass Gasification Systems***
 - *Originally Developed for Conversion of Rice Hulls*
 - *First Commercial Operation in 1982 and Still Operating*
 - *Eighteen Gasifiers in Operation Worldwide*
- ***Experience in the Design of Power Generation***
 - *Stuttgart 13 MWe Rice Hull Fueled Steam Cycle*
 - *Rossano 4.5 MWe Olive Waste Fueled Engine Generation*
- ***Full Scale Demonstration Facility In Tulsa***
 - *Third Party Independent Verification of Testing*
- ***Proven Fuel & Energy Flexibility & Scalability***
 - *Over Twenty (20) Biomass Materials Successfully Demonstrated*
- ***Scalable Technology***
 - *Commercial Systems Ranging in Size from One Ton per hour to over 20 tons per hour*





Gasification Technology





Experience with Poultry Litter

- ***Initial Demonstration Test in 1997***

- *Co-funded Testing Sponsored by the Southeast Regional Biomass Energy Program of the US Department of Energy*

- *Beddings of Wood Waste and Rice Hulls*

- ***Multiple Tests with a Variety of Litter***

- *Varying Moisture Content*

- *Customer Funded Tests with Chicken and Turkey Litter*

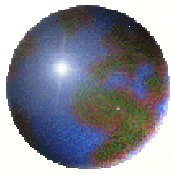
- ***Third Part Emissions Tests***

- *Primary Air Pollutants Proactively Removed and Controlled by Patent Pending S³ Technology to Normal Permittable Limits*

- *Nitrogen Oxides Controlled by Staged Combustion of Synthesis Gases*

- ***Recoverable Energy Can Be Determined and Can Be Guaranteed***



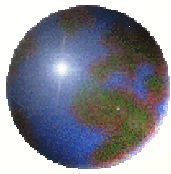


Litter Converted to Energy Via Gasification



- *Gasification is the Conversion of Solids into a Synthetic Gas*
- *The Intermediate, Synthetic Gas Can be Cleansed Prior to Use as Fuel*
- *Proactive Gas Cleansing is Cleaner Technology than Post Combustion Air Pollution Control*
- *Gasification Creates Gas, Not Pollution*
- *Most of the Phosphorus and Other Soil Nutrients Remain in the Ash – Typical Fertilizer Value 0 – 19 –10, Nitrogen, Phosphorus, Potassium*
- *Gasification Eliminates Problematic Fuel Glassing*
- *US Department of Energy Promotes Gasification*
 - *Superior Energy Efficiency*
 - *Environmental Performance*





Synthesis Gas Scrubbing Technology

- *S³ Technology, Synthetic Scrubbing System*

- *Developed for Air Compliance with Litter Fuel*

- *Patent Pending*

- *Developed and Proven in Tulsa*

- *Proactively Removes Air Pollutants*

- *Captures Phosphorus, Chlorine, Sulphur and Other Chemicals as a Solid*

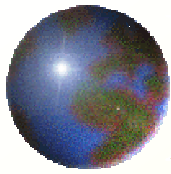
- *No Liquid Discharge*

- *Integrated with Gasification*

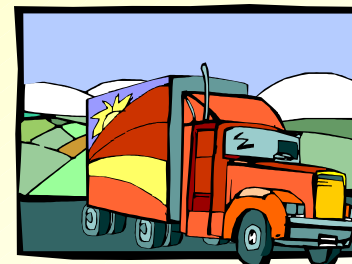
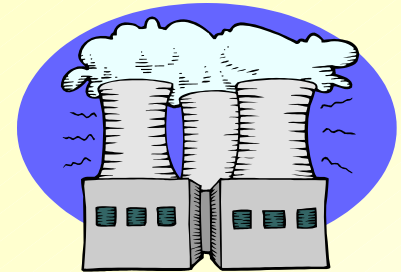
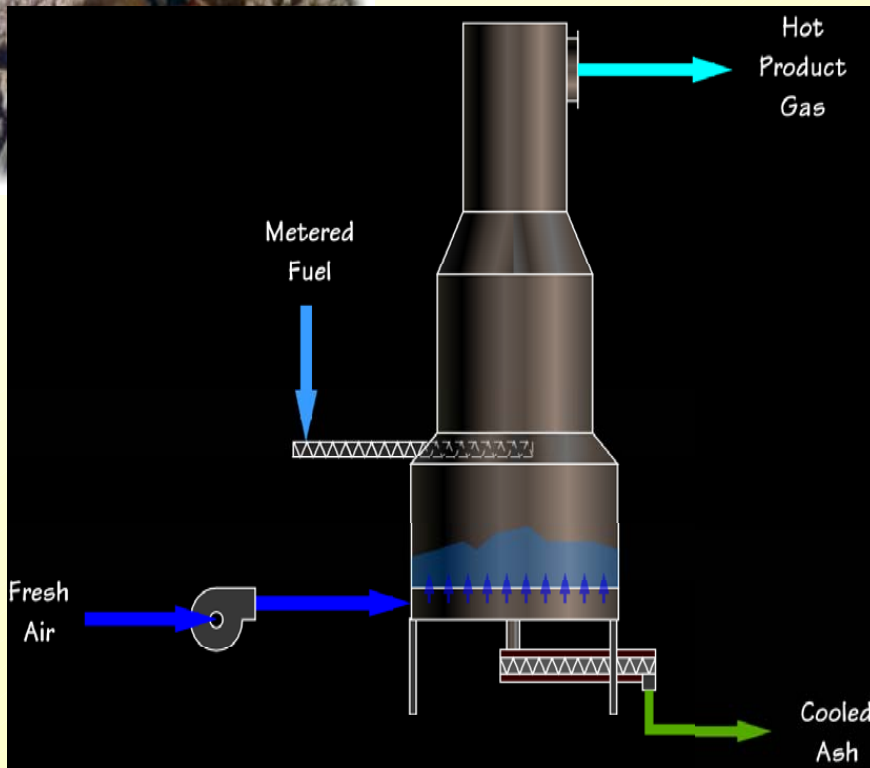
- *Provides Superior Environmental Compliance & Energy Efficiency*

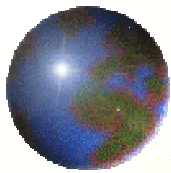
Primenergy[®]
biomass energy conversion L.L.C.





Conceptual Illustration

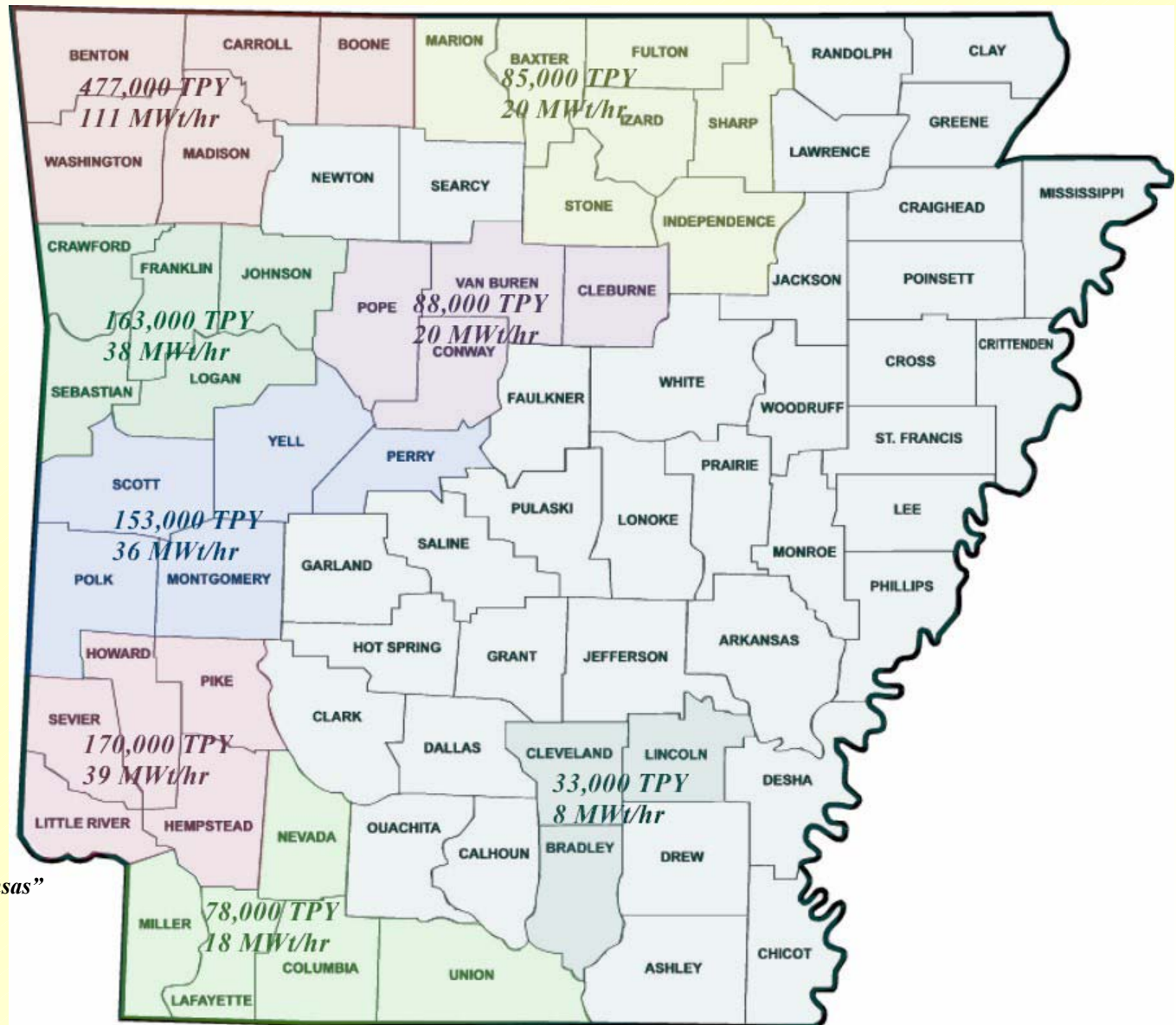


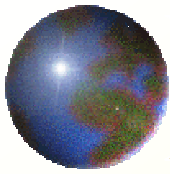


Biomass Resources (Poultry Litter)

- **1,245,000 Tons produced in concentrated regions of Arkansas**

- **290 MWt/hr potential energy production from litter**





Summary

- *Litter to Energy Provides*

- *An Alternate Use of Litter as an Environmentally Friendly “Green” Energy Source*

- *The Treatment of Litter as an Energy Asset*

- *A Solution for the Watershed*

- *Environment*

- *Diversion of Litter from Land Application*

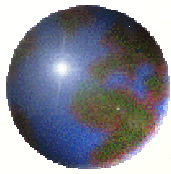
- *Displaces Carbon Dioxide and Sulfur Oxide from Fossil Fuel Power Generation*

- *Industry*

- *Provides a Year Round Litter Outlet for the Poultry Industry*

- *Increases Employment from Plant Operations and Litter Procurement*





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